**Question 1:**

Find and sketch the largest region of the xy-plane for which the initial value problem

has a unique solution.

**Question 2:**

1. Solve the initial value problem
2. Obtain the general solution of the differential equation

**Question 3:**

1. Solve the differential equation
2. By using an appropriate substitution, or any other method, find the general solution of the differential equation

**Question 4:**

Let where , be a given family of curves. Find the family of orthogonal trajectories for this family of curves.

**Question 1:**

Find and sketch the largest region of the xy-plane for which the initial value problem

has a unique solution.

**Solution:**

is continuous for: , ,

, ,

,

,

is continuous for:, , ,

, , ,

,

, are continuous on:

**The region**

**is the largest region for which the IVP has a unique solution.**

**Question 2:**

1. Solve the initial value problem

**Solution:**

Separable

**Question 2:**

1. Obtain the general solution of the differential equation

**Solution:**

Multiply by (cosx)

Linear

**Question 3:**

1. Solve the differential equation

**Solution:**

**Question 3:**

1. By using an appropriate substitution, or any other method, find the general solution of the differential equation

**Solution:**

**Question 4:**

Let where , be a given family of curves. Find the family of orthogonal trajectories for this family of curves.

**Solution:**

Separable